

WHAT IS CLAIMED IS:

1. An electronic device which captures and accumulates variable levels of electrical energy in a soft storage means until the accumulated energy is of such a level that it can be efficiently transferred to a hard storage means, said device comprising:
 - 5 a) a source of variable and intermittent energy;
 - b) a first stage energy storage means suitable for capturing and accumulating the energy from the source;
 - c) a second stage energy storage means, which is capable of receiving a charge and
 - 10 storing this charge for later use; and,
 - d) an electronic means which senses and monitors the energy accumulated in the first stage storage means and then activating a charge management electronics means when there is sufficient energy in the first stage storage to efficiently charge the second stage energy storage means.
- 15 2. The device of claim 1 wherein said first stage energy storage means comprises an electrical device which exhibits capacitance or pseudo-capacitance behavior and has a low Electric Series Resistance (ESR).
- 20 3. The device of claim 1 further comprising a control circuit that senses an over-voltage condition in the first stage energy storage means and limits the voltage to a safe level.
4. The device of claim 1 further comprising a control circuit that senses the direction of current "into" versus "out of" the first energy stage storage means and activates the transfer of any useful energy from the first stage storage means to the second stage storage means even if the voltage in the first stage storage means is not optimal for such a transfer.

5. The device of claim 1 wherein said energy source is selected from the group consisting of photovoltaic cells, manually operated electro-magnetic mechanical generators, wind power, wave power, electric power utility mains, AC transformers, DC transformers, and combinations thereof.

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6. The device of claim 1 further comprising at least two first stage energy storage means.
7. The device of claim 1 further comprising at least two second stage energy storage means.

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8. The device of claim 7 wherein said charge management electronics comprises a programmable means for setting parameters used to effect said efficient charging of the second stage storage means.

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9. The device of claim 8 wherein said programmable means is selected from the group consisting of programmable software code, programmable logic chips, hardware pin connectors, and combinations thereof.

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10. The device of claim 8 wherein said charge management electronic means permits independent charging of at least some of said at least two second stage storage means.

11. A method for capturing and accumulating variable levels of electrical energy in a first stage energy storage means until the accumulated energy is of such a level that it can be transferred to a second stage energy storage means, said method comprising:
 - a) capturing and accumulating the energy into the first stage energy storage means;
 - b) sensing and monitoring the energy accumulated in the first stage storage means;and,

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- c) activating a charge management electronics means when there is sufficient energy in the first stage storage to efficiently charge the second stage energy storage means.

5 12. The method of claim 11 wherein said first stage energy storage means comprises an electrical device which exhibits capacitance or pseudo-capacitance behavior and has a low Electric Series Resistance (ESR).

10 13. The method of claim 11 further comprising:
 sensing an over-voltage condition in the first stage energy storage means; and,
 limiting the voltage to a safe level.

15 14. The method of claim 11 further comprising:
 sensing the direction of current "into" versus "out of" the first energy stage storage means; and,
 activating the transfer of any useful energy from the first stage storage means to the second stage storage means even if the voltage in the first stage storage means is not optimal for such a transfer.

20 15. The method of claim 11 wherein said energy source is selected from the group consisting of photovoltaic cells, manually operated electro-magnetic mechanical generators, wind power, wave power, electric power utility mains, AC transformers, DC transformers, and combinations thereof.

25 16. The method of claim 11 further comprising at least two first stage energy storage means.

17. The method of claim 11 further comprising at least two second stage energy storage means.

18. The method of claim 17 further comprising utilizing a programmable means for setting parameters used to effect said efficient charging of the second stage storage means.

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19. The method of claim 18 wherein said programmable means is selected from the group consisting of programmable software code, programmable logic chips, hardware pin connectors, and combinations thereof.

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20. The method of claim 18 wherein said charge management electronic means permits independent charging of at least some of said at least two second stage storage means.